Course Policy:

Department	Information Technology
Faculty	Computer Science
Course Code	BIT-364
Course Title	Advance Networking
Credit hour	4
Pre-Requisite	Data Comm and Computer Networking
Course Instructor	Baitullah Malakhil
Text Book	CCNA Routing and Switching Study Guide - Lammle, Todd
Reference Book	CCNA Routing and Switching Study Guide - Lammle, Todd

1. Course Description:

This course is designed to equip the students with the basic knowledge of IP addressing & IPv4 submitting, Cisco Switch & Router Operations, static routing, default routing, dynamic routing, routing protocols such as RIP, IGRP, EIGRP, OSPF, VLAN & VTP, switch functions & STP, Access Control List and NAT. The course will enable the students to practically work with the above mentioned protocols and services on Cisco devices.

2. Course Learning Objectives (CLO):

1. Knowledge of IPv4 and IPv4 sub netting
2. Knowledge of hub, switch and router operations
3. Theoretical and practical knowledge of types of routing including static routing, default routing and dynamic routing.
4. Practical and theoretical skills knowledge of different dynamic routing protocols (i.e. RIP, EIGRP & OSPF) and the classification of routing protocols
5. Layer 2 loops or Switch loops prevention using the STP (spanning tree algorithm)
6. Breaking down a large physical switched network into many smaller logical network using VLAN & VTP technologies.
7. Restricted access to devices or networks using different types of ACLs.
8. Using NAT to translate private IP into public and vice versa.

Course Policy:

3. Learning Domain:

- Cognitive (knowledge)
- Affective (Attitude)
- Psychomotor (Physical or Manual skills)

Only cognitive domain is used for this course while the rest two cannot applied here

4. Course Learning Objectives Mapping with Bloom Taxonomy:

1) Remembering
2) Understanding
3) Applying
4) Analyzing
5) Evaluating
6) Creating

COLs	1	2	3	4	5	6
CLO1	True	True	True			
CLO2		True				
CLO3		True	True			
CLO4	True	True	True			
CLO5		True	True			
CLO6		True	True			

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CLO7		True	True			
CLO8		True	True			

5. Course Teaching Methods

1	Lecture
2	Problem solving Learning
3	Interactive Learning
4	Practical sessions

6. Grading Scheme

Mid Term	20%
Assignments	10%
Quiz	10%
Final Term	60%

Course Policy:

7. **Weekly Course Breakdown:**

Class (50 mins)	Week #	Topic	Learning outcome	Instructor Activity	Student Activity	Assessment
1	1	**Introduction of the course:** - Introduction to the course - Introduction to network & internetwork - Introduction to Cisco Courses	- At the end of the class the students will be able to relate the course with other pre-requisites. - The students will be able to familiarize with course contents. - The students will be able to explain the importance open source server OS and other application software	- AO: What the students think about Cisco Platform? - How it relates to the products of other vendors? - PPT presentation lecture - Close: what will the student be able to do after successfully completion of the course?	- Discussion - listening the lecture	-Q&A - feedback
2		- Broadcast domain and collision domain - Hub operation - Switch operation - Router operation	At the end of the class the Students will be able to: - Understanding Hub, Switch, Router and their operations - Understanding the broadcast and collision domains	- AO: how do Hubs, Routers and Switches Operate? - ID: Lecture presentation - Close: summarizing the lecture	-Brain storming -Listening to the lecture -Note taking - one end question	-feedback -Q&A - Reflection. Summative: 1Q for final exam.

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1	2	**Introduction to IP, sub-netting & VLSM** - IPv4 & its classes - APIPA & Loopback IP - Private & Public IP - VLSM	- Understanding IPv4 addresses in details including private & public IP addresses, APIPA and loopback IP.	- AO: how can we understand and use the IP addresses in real scenarios? - Lecture presentation - close: summarizing the lecture	- understand and implement IP - Discussion - listening the lecture - taking notes	- feedback - asking 1-5 questions randomly - reflection - Assignment -
2		- Subnet mask notations - Sub-netting IPv4 - Sub netting class C - Sub netting class B - Sub netting class A	- Student will must be able to sub net any IPv4 address as per the requirement of an organization.	- AO-Asking the students about the previous topic. - Lecture presentation - close: summarizing the lecture	- understanding and implementation of sub netting - practicing sub netting in notebooks	-reflection -peer rating -Assignment -HW
1	3	- Cisco IOS, Accessing Cisco Router/Switch, Router/Switch Boot Process & Cisco Router Modes: - Cisco ISO - Accessing Router/Switch by multiple methods - Router or switch boot process	- At the end of the class the students will be able to: - Understanding IOS and its functionalities User various Linux commands for local and online help	- AO: How to Access Cisco Routers/Switches? - ID-PPT presentation lecture - Close: list what you have learn in this class?	- think pair share - Discussion - listening the lecture - understanding the outcome of the commands - Taking short notes	- Feedback - Reflection - Assignment - Summative: - -Final exam question.
2		- Cisco router modes - CDP - CDP hold time - CDP update time	- At the end of the class the students will be able to explain: - How the CDP works? - How to collect information about neighbor cisco devices - Working with CPD commands and enabling and disabling CPD on	- AO: concept of CPD with its commands? - ID-PPT presentation lecture - Practical session in class - Close: list what you have learn in this class	- think pair share - Discussion - listening the lecture - Learn how to use CDP to discover the network design	- Feedback - Reflection - Assignment - Summative: - -Lab report - -Final exam question.

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			interface and router level			
1	4	- Introduction to Telnet and SSH - telnet configuration and verification - SSH configuration and verifications -	- At the end of this course the Students will be able to: - Understand the concept of telnet and SHH - Know how to configure SSH and telnet - Know the difference between telnet and SSH	- AO: what is the significance remote access? How do telnet and SSH work? - ID-PPT presentation lecture - Practical session in class - Close: list what you have learn in this class?	- think pair share - Discussion - listening the lecture - taking short notes	- Feedback - Reflection - Assignment - Summative: - Final exam question.
2		- COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing CDP, Telnet, SSH and other basic router commands	- AO: lab agenda and objectives - ID: assisting students in computer lab - Close: assisting students with lab work	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**5**	- Static routing - Default routing - Dynamic routing - Pros and cons of static routing	- Understanding the concept of routing - Why we need routing? - Static, default and dynamic routing	- AO: what is the significance of routing? How and where to use static and dynamic routing? - ID-PPT presentation lecture - Close: list what you have learn in this class?	- think pair share - Discussion - listening the lecture - taking short notes	- Feedback - Reflection - Assignment - Summative: - Final exam questions
2		- Link-state routing protocols - Distance vector routing protocols - Hybrid routing	- Types of routing protocols - Understanding and differentiating distance vector, link state and	- AO: what are the types of routing protocols? How and where to use a specific type of	- Hands on practice - Implementation of the previous	- Feedback - Reflection - Assignment - Summative:

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		protocols - AD value - Metric	hybrid routing protocol - Understanding AD value and metric	routing protocol? - ID-PPT presentation lecture - Close: list what you have learn in this class?	lesson - Taking short notes - Listening to lecture	- HW
1	**6**	- Configuration of static routing - Configuration of default routing - Trouble shooting of static and default routing - Verification commands for static and default routing	- Configuration and troubleshooting of static and default routing -	- AO: How to configure and troubleshoot static and default routing? - Lecture presentation - Practical session in class - close: summarizing the lecture	- think pair share - Discussion - listening the lecture - taking notes	- Feedback - Reflection - Assignment - Summative: - Final exam questions - Summative: HW
2		- COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing static and default routing	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**7**	- Detailed description of the RIP - Difference between RIPv1 and RIPv2 - RIPv1 and RIPv2 configuration - Troubleshooting and verification of RIPv1 and RIPv2 -	- Understanding RIP, its characteristics, advantages and disadvantages, RIP version, RIP vs IGRP - RIP troubleshooting and verification commands	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- Feedback - Reflection - Assignment - Summative: - Final exam questions - Summative: HW
		- COMPUTER LAB	- Implementation of the previous lesson	- AO: lab agenda and objectives	- Hands on practice	- Feedback - Reflection

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2		(STUDENTS PRACTICE)	practically in computer lab by students - Practicing RIPv1 and RIPv2	- ID: providing lab agenda and instruction for students - Close: assisting students with lab work	- Implementation of the previous lesson - Lab report	- Assignment - Summative: - -Lab report
1	**8**	**IGRP & EIGRP:** - Detailed description of IGRP - Detailed description of EIGRP - Difference between IGRP & RIP - EIGRP configuration - EIGRP troubleshooting and verification	- Explain IGRP & EIGRP concepts, characteristics, packet types, algorithms, RTP,AS number, routing updates, configuration and verification commands	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- feedback - Assignment - Reflection. - Formative: 1-5 question random selection - HW
2		- COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing EIGRP	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work -	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**9**	**OSPF:** - Detailed description of OSPF - DR & BDR operations - Setting RID - Configuration of OSP - Troubleshooting and verification of OSPF	- Understanding OSPF concepts, characteristics, packet types, algorithms, DR & BDR,AS number, routing updates, configuration and verification commands	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- feedback - Assignment - Reflection. - Formative: 1-5 question random selection - HW

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2		**-** COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing OSPF	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work -	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**1 0**	**Switching and STP** - Switch operations - Switch functions - Introduction to STP - Root bridge and Non-root bridge - Designated and non-designated ports -	- Understanding main three functions of a switch - Understanding STP concept - Understanding STP terminologies - Working with STP	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- feedback - Assignment - Reflection. - Formative: 1-5 question random selection - Summative: 1Q for final exam
2		- Switch priority - Managing STP - Working with switch-port security **-**	- Modifying Switch priority for the selection of root bridge - Working with switch port security	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture - h -	- Hands on practice - Implementation of the previous lesson - Taking short notes - Listening to the lecture	- Feedback - Reflection - Assignment - Summative: - -HW
1	**1 1**	**VLAN** - Introduction to VLAN - VTP - VTP Domain - VTP Modes - Frames tagging	- Understanding the concept of VLAN, VTP, VTP Modes, Frame tagging and frame tagging protocols	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- feedback - Assignment - Reflection. - Formative: HW

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		-		the lecture -	-	
2		- Frame tagging protocols o ISL o Dot1Q **-** Access and trunk ports - Inter-VLAN routing using: - Using multiple links **-** Using router on-stick	- Understanding frame tagging and tagging algorithms including ISL and IEEE open standard 802.1Q - Inter-VLAN routing and its methods	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment -	- feedback - Assignment - Reflection. - Formative: HW
1	**12**	- Working with VLANs and VTP - Configuration of VLAN and inter-VLAN routing - Troubleshooting and verification of VLAN	- Creating, deleting, modifying VLANs - Working with VTP - Configuration of Inter-VLAN routing	- Asking opening class 1-5 question - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- feedback - Assignment - Reflection. - Formative: HW
2		**-** COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing VLAN, VTP and inter-VLAN routing	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**13**	**ACL** - Standard ACL - Extended ACL - Named ACL - ACL Configuration - ACL verification -	- Understanding the concept of ACL and its types - Working with ACL - Limiting access using ACL	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment - Practical session in computer lab	- feedback - Assignment - Reflection. - Formative: 1-5 question random selection - Summative: HW

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2		**-** COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing standard , extended and named ACL	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**14**	- NAT - NAT - PAT - Static NAT - Configuration of PAT using ACL - Verification of PAT	- Understanding the concept and need of NAT - Methods of NAT configuration -	- Asking opening class 1-5 questions - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- feedback - Assignment - Reflection. - Summative: HW
2		**-** COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing standard , extended and named NAT	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**15**	**Working with IPv6:** - Introduction to IPv6 - Assigning IPv6 to routers - Routing using IPv6 -	- Knowing how to work with IPv6 on network administration level	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- Assignment - Reflection. - Formative: 1-5 question random selection - Summative: 1Q for final exam

Course Policy:

2		- COMPUTER LAB (STUDENTS PRACTICE)	- Implementation of the previous lesson practically in computer lab by students - Practicing IPv6 routing	- AO: lab agenda and objectives - ID: providing lab agenda and instruction for students - Close: assisting students with lab work	- Hands on practice - Implementation of the previous lesson - Lab report	- Feedback - Reflection - Assignment - Summative: - -Lab report
1	**16**	- Review of the lessons of midterm - Addressing students problems - Guiding students for final exam	- Review	- Review all lessons after midterm	- Listening to the lecture - Rising up questions - Taking note of the answers	- Assignment - Reflection. - Formative: 1-5 question random selection - Summative: 1Q for final exam
2		- **Configuration of Router as a DHCP Server** - **Configuration of a Switch as a DHCP server** - **Verification commands**	- Configuration of a router/switch as a DHCP server	- Asking opening class 1-5 question by random selection - Lecture presentation - Practical session in class - close: summarizing the lecture	- Brain storming - Listening to the lecture - note taking - Performing the assignment	- Assignment - Reflection. - Formative: 1-5 question random selection - Summative: 1Q for final exam